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ATTORNEY DOCKET NO. 00786/339004

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Xinnian Dong *et al.*

Art Unit: 1638

Serial No.: 08/908,884

Examiner: A. Kubelik

Filed: August 8, 1997

Customer No.: 21559

Title: ACQUIRED RESISTANCE GENES AND USES THEREOF

Commissioner For Patents
Washington, D.C. 20231

Pending Claims

1. An isolated nucleic acid molecule encoding an acquired resistance polypeptide comprising an ankyrin repeat, wherein said acquired resistance polypeptide confers, on a plant expressing said polypeptide, resistance to a plant pathogen.

2. The isolated nucleic acid molecule of claim 1, wherein said polypeptide activates the expression of a pathogenesis-related polypeptide.

4. The isolated nucleic acid molecule of claim 1, wherein said isolated nucleic acid molecule is derived from an angiosperm.

5. The isolated nucleic acid molecule of claim 4, wherein said angiosperm is a member of the *Solanaceae*.

6. The isolated nucleic acid molecule of claim 4, wherein said angiosperm is a member of the *Cruciferae*.

7. The isolated nucleic acid molecule of claim 1, wherein said nucleic acid molecule is genomic DNA.

8. The isolated nucleic acid molecule of claim 1, wherein said nucleic acid molecule is cDNA.

9. The isolated nucleic acid molecule of claim 1, wherein said plant pathogen is a bacterium, virus, viroid, fungus, nematode, or insect.

10. An isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the genomic nucleic acid sequence of Fig. 4 (SEQ ID NO:1), wherein said isolated nucleic acid molecule encodes an acquired resistance polypeptide comprising an ankyrin repeat that confers, on a plant expressing said polypeptide, resistance to a plant pathogen.

11. An isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the cDNA of Fig. 5 (SEQ ID NO:2), wherein said isolated nucleic acid molecule encodes an acquired resistance polypeptide comprising an ankyrin repeat that confers, on a plant expressing said polypeptide, resistance to a plant pathogen.

12. An isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the DNA sequence of Fig. 7A (SEQ ID NO:13), wherein said isolated nucleic

acid molecule encodes an acquired resistance polypeptide comprising an ankyrin repeat that confers, on a plant expressing said polypeptide, resistance to a plant pathogen.

13. The isolated nucleic acid molecule of any one of claims 10-12, wherein said nucleic acid molecule encodes a polypeptide that activates the expression of a pathogenesis-related polypeptide.

15. The isolated nucleic acid molecule of any one of claims 1 or 10-12, wherein said nucleic acid molecule is operably linked to an expression control region.

16. A vector comprising the nucleic acid molecule of any one of claims 1 or 10-12, said vector directing expression of the polypeptide encoded by said nucleic acid molecule.

17. A transgenic cell comprising (i) an isolated nucleic acid molecule encoding an acquired resistance polypeptide comprising an ankyrin repeat, (ii) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the genomic nucleic acid sequence of Fig. 4 (SEQ ID NO:1), (iii) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the cDNA of Fig. 5 (SEQ ID NO:2), (iv) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the DNA sequence of Fig. 7A (SEQ ID NO:13), or (v) a vector comprising said nucleic acid molecule and directing expression of the polypeptide encoded by said nucleic acid molecule; wherein said acquired resistance polypeptide confers, on a plant expressing said polypeptide, resistance to a plant pathogen.

18. The transgenic cell of claim 17, wherein said transgenic cell is a plant cell.

19. The transgenic cell of claim 17, wherein said transgenic cell is a bacterial cell.

20. The transgenic cell of claim 19, wherein said transgenic bacterial cell is *Agrobacterium*.

21. The transgenic cell of claim 18, wherein said transgenic plant cell has increased resistance to a plant pathogen.

22. A transgenic plant comprising (i) an isolated nucleic acid molecule encoding an acquired resistance polypeptide comprising an ankyrin repeat, (ii) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the genomic nucleic acid sequence of Fig. 4 (SEQ ID NO:1), (iii) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the cDNA of Fig. 5 (SEQ ID NO:2), (iv) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the DNA sequence of Fig. 7A (SEQ ID NO:13), or (v) a vector comprising said nucleic acid molecule and directing expression of the polypeptide encoded by said nucleic acid molecule; wherein said acquired resistance polypeptide confers, on a plant expressing said polypeptide, resistance to a plant pathogen; and wherein said nucleic acid molecule or said vector is expressed in said transgenic plant.

23. The transgenic plant of claim 22, wherein said transgenic plant is a transgenic angiosperm.

24. The transgenic plant of claim 23, wherein said transgenic angiosperm is a dicot.

25. The transgenic plant of claim 24, wherein said dicot is a cruciferous plant.

26. The transgenic plant of claim 24, wherein said dicot is a solanaceous plant.

27. The transgenic plant of claim 23, wherein said transgenic angiosperm is a monocot.

28. A seed from the transgenic plant of claim 22.

29. A cell from the transgenic plant of claim 22.

36. A method of producing an acquired resistance polypeptide, said method comprising the steps of:

(a) providing a cell transformed (i) an isolated nucleic acid molecule encoding an acquired resistance polypeptide comprising an ankyrin repeat, (ii) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the genomic nucleic acid sequence of Fig. 4 (SEQ ID NO:1), (iii) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the cDNA of Fig. 5 (SEQ ID NO:2), (iv) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the DNA sequence of Fig. 7A (SEQ ID NO:13), or (v) a vector comprising said nucleic acid molecule and directing expression of the polypeptide encoded by said nucleic acid molecule; wherein said acquired resistance polypeptide confers, on a plant expressing said polypeptide, resistance to a plant pathogen;

(b) culturing the transformed cell to express the nucleic acid molecule or the vector; and

(c) recovering the acquired resistance polypeptide.

40. A method of providing an increased level of resistance against a disease caused by a plant pathogen in a transgenic plant, said method comprising the steps of:

(a) producing a transgenic plant cell (i) an isolated nucleic acid molecule encoding an acquired resistance polypeptide comprising an ankyrin repeat, (ii) an isolated nucleic

acid molecule that hybridizes to a nucleic acid molecule comprising the genomic nucleic acid sequence of Fig. 4 (SEQ ID NO:1), (iii) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the cDNA of Fig. 5 (SEQ ID NO:2), (iv) an isolated nucleic acid molecule that hybridizes to a nucleic acid molecule comprising the DNA sequence of Fig. 7A (SEQ ID NO:13), or (v) a vector comprising said nucleic acid molecule and directing expression of the polypeptide encoded by said nucleic acid molecule; wherein said acquired resistance polypeptide confers, on a plant expressing said polypeptide, resistance to a plant pathogen; and

(b) regenerating a transgenic plant from the plant cell wherein the nucleic acid molecule or the vector is expressed in the transgenic plant and the transgenic plant is thereby provided with an increased level of resistance against a disease caused by a plant pathogen.

41. The method of claim 40, wherein said plant pathogen is a bacterium, virus, viroid, fungus, nematode, or insect.

42. The method of claim 40, wherein said plant pathogen is *Phytophthora*, *Peronospora*, or *Pseudomonas*.

43. The isolated nucleic acid of claim 1, wherein said nucleic acid complements an acquired resistance mutant.

44. The isolated nucleic acid of claim 43, wherein said mutant is an *Arabidopsis npr* mutant.

45. The method of claim 36, wherein said wherein said nucleic acid complements an acquired resistance mutant.

46. The method of claim 45, wherein said mutant is an *Arabidopsis npr* mutant.

47. The method of claim 40, wherein said nucleic acid complements an acquired resistance mutant.

48. The method of claim 47, wherein said mutant is an *Arabidopsis npr* mutant.

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